Fifth Grade Mathematics

Standard 1: Students will acquire number sense and perform operations with whole numbers, simple fractions, and decimals.

Objective 1: Represent whole numbers and decimals in a variety of ways.

a. Model, read, and write numerals from hundredths to one millions.
b. Write a *whole number* up to 999,999 in *expanded form* (e.g., 876,539 = 8 hundred-thousands, 7 ten-thousands, 6 thousands, 5 hundreds, 3 tens, 9 ones or 8x100,000 + 7x10,000 + 6x1,000 + 5x100 + 3x10 + 9).
c. Demonstrate multiple ways to represent whole numbers by using models and symbolic representations (e.g., 108=2x50+8; $108=10^2 + 8$).
d. Classify whole numbers from 2 to 20 as *prime* or *composite* and 0 and 1 as neither prime nor composite, using models.
e. Represent repeated factors using *exponents* up to three (e.g., $8=2x2x2=2^3$).

Objective 2: Identify relationships among whole numbers, fractions, decimals, and percents.

a. Order and compare *whole numbers*, fractions (including mixed numbers), and decimals using a variety of methods and symbols.
b. Rewrite mixed numbers and improper fractions from one form to the other.
c. Find the least common denominator for two fractions.
d. Represent commonly used fractions as decimals and percents in various ways (e.g., objects, fraction strips, pictures, calculators).

Objective 3: Model and illustrate meanings of operations and describe how they relate.

a. Identify the *dividend, divisor,* and *quotient* regardless of the division symbol used.
b. Determine whether a whole number is divisible by 2, 3, 5, 9, and/or 10, using the *rules of divisibility.*
c. Represent remainders as *whole numbers*, decimals, or fractions and describe the meaning of remainders as they apply to problems from the students' environment (e.g., If there are 53 people, how many vans are needed if each van holds 8 people?).
d. Model addition, subtraction, and multiplication of fractions and decimals in a variety of ways (e.g., using objects, number line, area models).
e. Model strategies for whole number multiplication (e.g., partial product, lattice) or division (e.g., partial quotient).
f. Select or write the number sentences that can be used to solve a two-step problem.
g. Describe the effect of place value when multiplying and dividing whole numbers and decimals by 10, 100, and 1,000.

Objective 4: Use fractions to communicate parts of the whole.

a. Divide regions, sets of objects, and line segments into equal parts using a variety of models and illustrations.
b. Name and write a fraction to represent a portion of a unit whole for halves, thirds, fourths, fifths, sixths, eighths, tenths, and twelfths.
c. Represent the simplest form of a fraction in various ways (e.g., objects, pictorial representations, symbols).
d. Represent mixed numbers and improper fractions in various ways (e.g., rulers, objects, number lines, symbols).
e. Rename *whole numbers* as fractions with different denominators (e.g., 5=5/1, 3=6/2, 1=7/7).
f. Model and calculate equivalent forms of a fraction and describe the process used.

Objective 5: Solve problems using the four operations with whole numbers, decimals, and fractions.

a. Determine when it is appropriate to use estimation, mental math strategies, paper and pencil, or a calculator.
b. Use estimation strategies to determine whether results obtained using a calculator are reasonable.
c. Multiply up to a three-digit *whole number* by a one- or two-digit whole number.
d. Divide up to a three-digit whole number *dividend* by a one-digit *divisor*.
e. Add and subtract decimals with digits to the hundredths place (e.g., 35.42+7.2; 75.2–13.45).
f. Add, subtract, and multiply fractions.
g. Simplify *expressions,* without *exponents,* using the *order of operations*.

Objective 6: Model and illustrate integers.

a. Identify, read, and locate *integers* on a number line.
b. Describe situations where integers are used in the students' environment.

Standard 2: Students will use patterns and relations to represent and analyze mathematical situations using algebraic symbols.

Objective 1: Recognize, analyze, and use patterns and describe their attributes.

a. Analyze and make predictions about patterns involving *whole numbers*, decimals, and fractions using a variety of tools including organized lists, tables, objects, and variables.
b. Extend patterns and describe a rule for predicting the next element.

Objective 2: Represent, solve, and analyze mathematical situations using algebraic symbols.

a. Recognize a variety of symbols for multiplication and division including x, • , and * as symbols for multiplication and ÷, ⌐ and a fraction bar (/ or -) as division symbols.
b. Recognize that a variable (◇, n, x) represents an unknown quantity.
c. Solve one-step equations involving *whole numbers* and a single variable (e.g., n÷7=3).
d. Recognize that the answer to a multiplication problem involving a factor of zero is equal to zero (e.g., 0x45=0).
e. Use expressions or one-step equations to represent real-world situations.

f. Use the *associative*, *commutative*, and *distributive properties* to compute with whole numbers.

Standard 3: Students will use spatial reasoning to recognize, describe, and identify geometric shapes and principles.

Objective 1: Describe, identify, and analyze characteristics and properties of geometric shapes.

a. Identify and draw *perpendicular lines*.
b. Draw, label, and describe *rays* and describe an angle as two rays sharing a common endpoint.
c. Label an angle as *acute*, *obtuse*, *right*, or *straight*.
d. Identify and describe *equilateral, isosceles, scalene, right, acute,* and *obtuse* triangles.
e. Identify the *vertex* of an angle or the *vertices* of a polygon.
f. Compare *corresponding angles* of two triangles and determine whether the triangles are *similar*.
g. Identify and describe *pyramids* and *prisms*.

Objective 2: Specify locations and describe spatial relationships using coordinate geometry.

a. Locate points defined by ordered pairs in the first *quadrant*.
b. Write an ordered pair for a point in the first quadrant.
c. Specify possible paths between locations on a *coordinate grid* and compare distances of the various paths.

Objective 3: Visualize and identify geometric shapes after applying transformations.

a. Identify a *slide (translation)* or a *flip (reflection)* of a shape across a line.
b. Demonstrate the effect of a *turn (rotation)* on a figure using manipulatives.
c. Relate *pyramids* and *prisms* to the *two-dimensional* shapes (*nets*) from which they were created.

Standard 4: Students will understand and apply measurement tools and techniques.

Objective 1: Identify and describe measurable attributes of objects and units of measurement.

a. Describe the relative size (e.g., bigger than, smaller than) among *metric* units of length (i.e., millimeter, centimeter, meter, kilometer).
b. Describe the relative size (e.g., bigger than, smaller than) among *customary* units of weight (i.e., ounce, pound).
c. Identify the correct units of measurement for *volume, area,* and *perimeter* in both metric and customary systems.
d. Estimate length, volume, weight, and area using metric and customary units.
e. Convert units of measurement within the metric system and convert units of measurement within the customary system.

Objective 2: Determine measurements using appropriate tools and formulas.

a. Measure length to the nearest 1/8 of an inch and to the nearest centimeter.
b. Measure *volume* and weight using *metric* and *customary* units.
c. Measure angles using a protractor.
d. Calculate *elapsed time* within a.m. or p.m. time periods.
e. Read and record the temperature to the nearest degree (above and below zero) when using a thermometer with a Celsius or Fahrenheit scale.
f. Calculate the *perimeter* of rectangles and triangles.
g. Calculate the *area* of squares and rectangles using a formula.

Standard 5: Students will collect, analyze, and draw conclusions from data and apply basic concepts of probability.

Objective 1: Formulate and answer questions using statistical methods to compare data.

a. Formulate a question that can be answered by collecting data.
b. Collect, compare, and display data using an appropriate format (i.e., *line plots*, bar graphs, *pictographs*, circle graphs, line graphs).
c. Identify *minimum* and *maximum* values for a set of data.
d. Identify or calculate the *mean*, *mode*, and *range.*
e. Propose and justify inferences based on data.

Objective 2: Apply basic concepts of probability.

a. Describe the results of investigations involving random outcomes using a variety of notations (e.g., 4 out of 9, 4/9, 4:9).
b. Recognize that outcomes of experiments and samples are fractions between 0 and 1.
c. Predict the probability of an outcome in a simple experiment.